

distinct lead in this matter, it may be hoped that the scheme, which has been long delayed, will be realised before long, and the reproach wiped away that the country which equals all the rest of the world in its shipping and shipbuilding lags behind other countries in utilising the experimental methods due to that great English man of science William Froude.

Until recent years work done by the Froudes and published by permission of the Admiralty furnished the best information available for guidance in propeller design, especially when associated with progressive trials of steamships. The experimental methods introduced at Torquay and Haslar have been adopted and extended of late by other workers having command of specially equipped hydraulic laboratories or tanks. Amongst these the Washington tank, belonging to the United States Navy Department, has taken a leading position under the able superintendence of Naval Constructor Taylor, who received his training as a naval architect at the Royal Naval College, Greenwich. In addition to this establishment, the United States has the great advantage of possessing experimental tanks attached to universities; these tanks are necessarily more available for research-work than any establishment can be which is created primarily and regularly employed for experimental work bearing directly on actual ship-construction. Prof. Durand—whose investigations on screw-propellers specially claim attention in this notice—for ten years past has closely studied the screw-propeller problem. His later experiments have been made at the hydraulic laboratory of Cornell University; they are systematic and thorough within the limits of the scheme laid down. The method and results have been admirably described and summarised in a memoir of about sixty pages. The Carnegie Institution of Washington made a grant in aid of the experiments, and has published the memoir, thereby conferring great benefit on all who are concerned in the propulsion of steamships, and furnishing a fresh illustration of the encouragement given to scientific research in the United States.

NOTES.

THE following fifteen candidates have been selected by the council of the Royal Society to be recommended for election as fellows of the society:—Mr. W. Barlow, the Earl of Berkeley, Mr. Dugald Clerk, Prof. A. Dendy, Prof. H. H. Dixon, Mr. J. Stanley Gardiner, Prof. W. Gowland, Mr. J. H. Grace, Prof. D. J. Hamilton, Mr. C. I. Forsyth Major, Mr. E. N. Nevill, Mr. W. H. Rivers, the Hon. Bertrand Russell, Dr. Otto Stapf, and Dr. J. F. Thorpe.

A SPECIAL general meeting of the Geological Society will be held on April 1 to consider a resolution relating to the admission of women to full fellowship of the society.

It is reported by The Hague correspondent of the *Globe* (March 3) that Prof. Kamerlingh Onnes, professor of physics in the University of Leyden, has succeeded in liquefying helium.

SIR OLIVER LODGE will deliver his presidential address to the Faraday Society on Tuesday, March 24. The subject of the address will be "Some Aspects of the Work of Lord Kelvin."

THE Paris correspondent of the *Times* reports that Prince Roland Bonaparte has placed at the disposal of the Academy of Sciences a sum of 100,000 francs (4000*l.*) to be employed in promoting discoveries by facilitating the task of investigators who have already given proof of

their ability by original work, but who may lack the resources necessary for undertaking or pursuing their investigations.

PROF. J. R. BRADFORD, F.R.S., Sir T. H. Holdich, K.C.M.G., and the Duke of Northumberland, F.R.S., have been elected members of the Athenæum Club under the provisions of the rule which empowers the annual election by the committee of nine persons "of distinguished eminence in science, literature, the arts, or for public services."

DR. ARTHUR KEITH, lecturer on anatomy at the London Hospital Medical College, has been appointed conservator of the museum of the Royal College of Surgeons, in succession to the late Prof. C. Stewart.

PROF. MILNE's discourse at the Royal Institution on "Recent Earthquakes," announced for Friday next, March 6, has been postponed until March 20. The discourse on Friday next will be delivered by Prof. Love on "The Figure and Constitution of the Earth."

IN a footnote to Cowper's poem (*Magnet* edition, 1834), a remarkable meteor, August 18, 1783, and a fog which covered Europe and Asia during the summer of 1783 are mentioned, as well as an earthquake in Sicily of unusual severity. A correspondent asks for details of these occurrences, or a reference to records of them.

THE following officers of the Asiatic Society of Bengal have been elected for the ensuing year:—*President*, the Hon. Justice Asutosh Mukhopadhyaya; *vice-presidents*, Dr. T. H. Holland, F.R.S., Dr. G. Thibaut, Mahamahopadhyaya Haraprasad Shastri; *general secretary*, Lieut.-Colonel D. C. Phillott; *treasurer*, Mr. J. A. Chapman.

WE learn from the *Times* that the Russian Government is dispatching a research commission to investigate some recent discoveries of mammoth remains in the Yakutsk province of north-east Siberia. The commission consists of a doctor of zoology, of the Academy of Sciences, the senior curator of the zoological department of the academy, and six junior laboratory students. The expedition, which is expected to be absent for a year or more, is supplied with a grant of 16,000 roubles (1600*l.*).

THE report of the committee appointed by the Treasury to inquire generally into the work now performed at the National Physical Laboratory has been published as a Parliamentary paper (Cd. 3926), which also includes a Treasury minute recording the approval by the Treasury of the recommendations contained in the report of the majority of the committee. The opinion of the 1898 committee, that the work proper for a National Physical Laboratory to undertake should include not only physical research directly or indirectly bearing on industrial problems, and the standardisation and verification of instruments, but also—under proper restrictions—the testing of materials, is in the first place endorsed. The committee then distinguishes "commercial testing" into "contractual" and "investigatory" testing—"contractual" testing being the ordinary testing of materials to ascertain whether their quality and behaviour are in accordance with the requirements of contracts; "investigatory" testing the investigation for commercial purposes of various substances in which no question of contract arises. To place restrictions upon "investigatory" testing would, it is pointed out, hinder the advance of knowledge. The committee thinks that the laboratory should remain entirely free with regard to "investigatory testing," and, as a rule, be debarred from undertaking "contractual testing"—though electrical, thermal, optical, and other physical tests are to

be regarded as exceptional, and such as the laboratory may undertake. In the second place, no restriction should apply, the committee reports, to "reference" testing wherever, in cases of dispute, the parties concerned agree to refer their differences to the authoritative decision of the laboratory, or where the laboratory is called in by a Court of law or of arbitration. Lastly, in view of the character of the laboratory as a public institution, the laboratory is to be free to accept any work which any Government department may desire to commit to it. Subject to these observations, the committee does not consider that any alteration is required in the scope of the work of the National Physical Laboratory as defined by the committee of 1898. In a note added to the report Sir Andrew Noble and Sir J. Wolfe-Barry express the opinion that the restriction recommended in respect of "contractual testing" should come to an end after a definite time—say ten years.

IN the report of the Maidstone Museum, Library, and Art Gallery for 1907, attention is directed to the unprecedentedly large number of visitors during the year. It is satisfactory to notice that special attention is being concentrated on the local collection in the Kent county room, for which a special subscription list has been opened.

WE have received from Messrs. Cassell and Co., Ltd., the first part of a revised and enlarged edition of Mr. R. Kearton's "British Birds' Nests." It is to be completed in sixteen fortnightly parts at the price of one shilling each. When the beauty and number of the illustrations—inclusive of coloured plates of eggs—are taken into consideration, the new issue is a marvel of cheapness, and should command a large sale.

It is announced in the January issue of the *Emu* that active steps are being taken by the Australian Ornithologists' Union to make more effective the laws for the protection of egrets and birds-of-paradise, groups which are specially persecuted for the sake of their plumage. The union is likewise encouraging lighthouse keepers to record observations with regard to the birds that strike against the lighthouses on the Australasian coasts on migration.

ACCORDING to Mr. T. Southwell's notes in the February *Zoologist*, the Arctic whaling voyage of last year, so far as the prime object of pursuit is concerned, was a disastrous failure. The seven vessels which left Dundee captured, in fact, only three right-whales among them, one being little more than a "sucker," which yielded only half a hundredweight of whalebone. This juvenile was taken in Davis Strait, while the two larger whales were captured in Greenland waters. The two latter yielded 32 cwt. of "bone," the price of which is now about 2400l. per ton. It is noteworthy that during the last two seasons most of the few whales taken were from Greenland waters, where the species was supposed to be practically exterminated.

THE biting flies of India form the subject of Bulletin No. 7 of the Agricultural Research Institute at Pusa. The account, which is drawn up by Mr. H. M. Lefroy, the Government entomologist, is intended to pave the way for a full investigation into the natural history of these insects, and has been published to a great extent with the view of stimulating the collection of specimens all over the country. If such collection be carried out systematically, there is little doubt that a number of new species will be brought to light, especially among groups like the

sand-flies, represented by species of minute size. The Bulletin contains two coloured plates of horse-flies and cattle-flies, with, in some instances, their larvæ and eggs as an aid to the identification of species.

WE have received copies of four papers recently issued by the Entomological Bureau of the U.S. Department of Agriculture. The first of these, by Dr. W. E. Hinds, is devoted to further investigations with regard to the capability of natural agencies for holding in check the ravages of the pernicious cotton-boll weevil. On the whole, a hopeful view of the matter is entertained. The factors in question are conditions of temperature and moisture, predaceous and parasitic foes, and food-supply. While it may be impossible to increase the effectiveness of these agencies, there is reason to believe that others may be caused to lessen materially the weevil's power of mischief. A second paper treats of the ravages of the caterpillars of the catalpa hawk-moth (*Ceratomia catalpæ*) on catalpa trees, which are sometimes completely stripped of their foliage. The two remaining papers deal respectively with the lesser apple-worm and wax-moths in connection with bee-keeping. In the case of the latter it is shown that the idea that the larvæ of wax-moths are beneficial to bee-keepers is erroneous.

A REPORT on marking and transplantation experiments with plaice in Danish waters, by Mr. A. C. Johansen, has recently been issued by the Danish Commission for the Study of the Sea (*Medd. Kommiss. for Havundersøgelser. Ser. Fiskeri*, Bd. ii., No. 5). The report contains an account of experiments made by the Danish Government in connection with the international fishery investigations. It is shown that the rate of growth of plaice varies in different districts, a result which confirms the conclusions which have been arrived at by English fishery investigators. Considerable light is also thrown by the experiments on the migration of plaice in Danish waters. Much importance is attached by Johansen to the facts that in the experiments in the Horns Reef area the value of the recovered specimens surpasses the value of all the liberated ones, and that in the Kattegat experiments the size at which the value of all the recovered specimens is equal to the value of all the liberated ones is higher than the present Danish size limit for Kattegat plaice (ca. 25.6 cm.). From the latter result it is suggested that a size limit for plaice in the Kattegat somewhat higher than that now enforced by Denmark might be considered by the international authorities with advantage.

MR. S. YAMANOCHI contributes to the *Botanical Gazette* (January) an account of sporogenesis in the fern genus *Nephrodium*, dealing with nuclear changes in *Nephrodium molle*. The author comes to the conclusion that in the normal life-history of the genus there is a reduction of chromosomes in sporogenesis, and that the first nucleus which contains the reduced number of sixty-four or sixty-six chromosomes is the spore; further, that the first division of the spore is heterotypic, but the reduction is only completed in the second homotypic division.

THE economic value of the sunflower plant as a source of oil yielded by the seeds not infrequently forms the subject of inquiry. From the account of the plant that is provided by Mr. D. Hooper in the *Agricultural Ledger* (No. 1, 1907), issued by the Government of India, it is evident that as a crop it offers little inducement to planters except in southern Russia—possibly also in China—where there is a local consumption of the kernels roasted or salted, and the oil is in request for culinary or edible

purposes. The pamphlet contains information with regard to experimental cultivation in India and the United States of America.

An article communicated by the chief conservator of forests in Burma, Mr. F. B. Bryant, is published in the *Indian Forester* (December, 1907), in which a strong case is made out against continued fire conservancy in certain of the moist teak forests. The policy of fire conservancy continued over a period of years has resulted in excessive development of the bamboos *Bambusa polymorpha* and *Cephalostachyum pergracile*, which smother the young teak and other light-demanding trees. It is also pointed out that, owing to the presence of the latter bamboo, extensive regeneration of teak when the *Bambusa* flowers gregariously is likely to be frustrated. The sanction of the Government of Burma to the abandonment of fire conservancy in selected areas has already been granted.

An important article on the Douglas fir as a commercial timber tree is contributed to the Transactions of the Royal Scottish Arboricultural Society (vol. xx., part i.) by Mr. J. D. Crozier. Owing to the difference in the rate of growth, it is essential to distinguish between the "green" Oregon variety and the slower growing "glaucous" Colorado variety. The author alludes to the excellent results shown by pure plantations on the Grampians, but expresses the opinion that the Douglas fir is not adapted to mixed plantations unless with the Norway spruce. As a suitable crop for poor and exposed ground, Sir John Stirling-Maxwell recommends the mountain pine, *Pinus montana*. Three varieties are specified, the upright, the intermediate, and the dwarf forms. The first is the more valuable, and grows at high elevations, notably in the Pyrenees. The intermediate is principally useful for afforestation of heaths; the dwarf form has no sylvicultural interest.

THE Director-General of Indian Observatories has issued a memorandum (dated December 6, 1907) on the meteorology of October and November, 1907, with a discussion of the conditions affecting the precipitation during the cold weather of 1907-8. These seasonal forecasts, although at present only general opinions based on past experience, are of very great importance both to the Government and to agriculturists. On the mean of the whole country, the rainfall in October was 52 per cent. and in November 31 per cent. in defect. The records of the last thirty years, including some selected from places outside India, show that conditions like those of the past season have been followed by a deficiency of precipitation in January more often than by an excess. The data then available for February throw very little light upon the probable rainfall of that month.

A TOUCH of wintry weather has spread over the whole country during the past week, and somewhat heavy falls of snow have occurred over a large part of Great Britain, whilst the temperature has been lower than for some time past. Strong winds and gales have been experienced in many places, and since March set in our weather has been under the influence of cyclonic disturbances passing down the North Sea. The Summary of the Weather issued by the Meteorological Office shows that for the winter season—December to February—the mean temperature over the United Kingdom was nowhere very different from the average. The heaviest rainfall for the three months occurred in the north of Scotland, where the aggregate measurement was 17.19 inches, whilst the least aggregate fall was 5.21 inches, in the north-east of England. The

winter rainfall was generally in excess of the average over the northern portion of the kingdom, but in defect elsewhere. The greatest excess was 1.61 inches, in the north-west of England, whilst the greatest deficiency was 2.65 inches, at the English Channel stations. The number of days with rain ranged from seventy-one in the north of Scotland to forty-seven in the south of England and the Midland counties. The greatest duration of sunshine for the winter was 203 hours, in the Midland counties, which is twenty-nine hours more than the average. The least duration was ninety-five hours, in the north of Scotland.

At the instance of Prof. Ricchieri, of the Accademia Scientifico-Letteraria, Milan, the reader of a paper on the spelling of place names at the sixth International Geographical Congress, held at London in 1895, the organising committee of the ninth International Geographical Congress, which is to meet at Geneva on July 27 to August 6, has placed on the list of agenda of the congress the following question:—What are the principal difficulties in the way of arriving at an international agreement on the transcription and orthography of geographical names, and in what manner can they be surmounted? Prof. Ricchieri, believing that if this problem is to be solved at all it can only be by slow stages and methodical procedure, proposes that all that should be aimed at in the first instance should be a preliminary understanding among a few men of different nationalities interested in this question as to the fundamental points on which it is necessary that a final agreement should, if possible, be reached, and that a statement of those points should be laid before the congress at Geneva, which should then be asked to appoint a small committee to study and procure the discussion of those points, and ultimately to draw up proposals and resolutions thereon. He further suggests that this committee should be expected to publish its proposals at least one year before the meeting of the next International Congress, which, it is hoped, might then be in a position to draw up final resolutions on the subject. This scheme of operations has received the support of Prof. Henri Cordier, of the École spéciale des langues orientales, Paris; Prof. Robert Sieger, of the University of Graz; and of Mr. G. G. Chisholm, Birkbeck College, University of London, who have agreed to cooperate with Prof. Ricchieri in drawing up the preliminary statement of fundamental points requiring solution to be laid before the Geneva congress. Mr. Chisholm will be glad to forward to Prof. Ricchieri any suggestions on this question sent to him at his private address (59 Drakefield Road, Upper Tooting, London, S.W.).

THE curious phenomenon of a soft steel disc revolving at a high speed cutting hard steel has attracted the attention of numerous observers, and Mr. F. W. Harbord has endeavoured to throw light on the subject by publishing in the *Engineer* of February 21 the results of a microscopic examination of the revolving disc and of the material subjected to its action. He finds that the material acted upon is heated at the point of contact to a temperature approaching, if not equal to, the melting point of steel, and that this high temperature is confined practically to the surface in contact with the disc.

In the *Engineering Magazine* (vol. xxxiv., No. 5) attention is directed by Mr. Clarence Hall and Mr. W. O. Snelling to the waste of life in American coal-mining. Four recent mine disasters in the United States, with the loss of nearly one thousand lives, emphasise the urgent importance of the theme. Statistics show in regard to

deaths per million tons of coal that the United States not only occupies a position worse than that of European countries, but also exhibits a general increase in the rate, whereas every other country has shown a decrease. The situation is still worse when it is considered that the natural conditions in America for raising coal with the minimum amount of danger to the workmen employed are as favourable as in any other country in the world. The natural result of the working of the thinner and less favourably mined seams will be greatly to increase the death-rate unless regulations based on careful investigations are rigidly enforced.

EGYPT furnishes a region of great scientific interest which is as yet almost unexplored in many branches of knowledge, and it often happens that observations which seem commonplace to those resident in the country are of great value to workers elsewhere. The success which attended the periodical *Survey Notes* during the fifteen months it has been in existence has suggested that its scope might be extended with advantage, and with that object it has been decided to include communications on all branches of science. The magazine, which will in future be entitled the *Cairo Scientific Journal*, makes, in its January issue, a good start. The principal contents are papers on an expedition to Addis Abbaba, by Mr. J. I. Craig; on the underground waters of Egypt, by Mr. H. W. Beckett; on the use of the slide-rule in surveying, by Dr. J. Ball; on azimuth checks, on traverse work, by Mr. M. Villiers Stuart; on upper air research at Helwan, by Mr. B. F. E. Keeling; and on temperature and constructional stability, by Mr. J. I. Craig.

ON February 18 Mr. J. J. Prest read before the Institution of Civil Engineers a paper describing a remarkable achievement in mining engineering, the shaft sinking at the Horden colliery, south-east Durham. The work was of exceptional difficulty owing to the large volumes of water encountered in sinking through the magnesian limestone and sands of Permian age. In view of possible legislative interference with the hours of underground labour, it was decided to sink three shafts, two 20 feet and one 17 feet in finished diameter. The north shaft was begun on November 6, 1900, and was finished at a depth of 419 yards on July 23, 1904. The south shaft was begun on February 28, 1901, and was finished at a depth of 302 yards on September 1, 1905. The east shaft, 17 feet in diameter, was begun on September 3, 1900, and was finished at a depth of 406 yards on November 6, 1905. The maximum feeders of water pumped simultaneously at any one period amounted to 9230 gallons per minute, from the east and south shafts, from September 23 to November 26, 1903. The production of coal from this colliery is now averaging a million tons per annum.

THE annual report of the council of the Institution of Mechanical Engineers, presented at the annual meeting of members on February 21, summarises the progress and work of the institution during the past year. The council has accepted from Mr. Charles Hawksley an offer of 100*l.* for the foundation of a scholarship or premium in connection with the institution, to commemorate the centenary of the birth of his father, Mr. Thomas Hawksley, past-president. In connection with the alloys research committee it is noted that sea-water corrosion tests on copper-aluminium alloys are being carried out at Portsmouth Dockyard by the National Physical Laboratory. A systematic investigation of the ternary alloys of copper and aluminium with other metals, in the first place with

manganese, zinc, and nickel, has been begun, and the preliminary investigation of the copper-aluminium manganese alloys is approaching completion. The council has made a small grant to Dr. H. C. H. Carpenter to investigate at the Manchester University the conditions which have to be observed if metal castings are to be capable of being gas-tight and steam-tight. Some further experiments on the large gas engine at the University of Birmingham are to be carried out by Prof. F. W. Burstall with a water-brake and with both optical and string indicators. The research committee on the value of the steam-jacket has met twice during the year, and designs are being prepared by Prof. T. Hudson Beare for carrying out jacket experiments with a larger apparatus than that formerly used by the committee. Information on the present state of knowledge on the following subjects is also being collected, previous to the appointment of research committees for prosecuting further inquiries:—(1) the features of refrigerating machinery in which further investigation is needed; (2) the transfer of heat across metallic surfaces in contact with water and with gases; (3) the action of steam passing through nozzles and steam turbines.

THE *Physikalische Zeitschrift* for February 15 contains an account of Dr. H. W. Schmidt's experiments on the effect of high temperatures on the disintegration of radium C. The work was undertaken to decide between the conclusion of Messrs. Makower and Russ, that high temperature diminished temporarily the activity of radium, and that of Mr. Bronson, who denied the existence of such an effect. Dr. Schmidt's experiments were made on radium C prepared by von Lerch's method. The preparation was enclosed in a quartz tube which could be heated to 1300° C. in an electric furnace. The activity was measured by the fall of the leaves of a gold-leaf electroscope placed close to the furnace. The author concludes that at 1300° C. the preparation behaves exactly as at ordinary temperatures.

THE theory of the radiation of the Auer incandescent gas mantle is discussed by M. M. Foix in the February number of the *Journal de Physique*. It is generally admitted that the mantle owes its brilliance to its selective radiation, which appears, according to the researches of Prof. Rubens, to be brought about by the addition of a little oxide of cerium to oxide of thorium. M. Foix now comes to the conclusion that the luminous efficiency of the mantle can be increased by carrying the dilution of the oxide of cerium in the oxide of thorium a further stage, the result being brought about by the diminution of the infra-red radiation of the mantle and a consequent increase of its temperature. The best proportion of the oxides appears to be 1 of cerium to 100 of thorium.

THE attention of those of our readers who practise photography is directed to the catalogue of photographic dry plates, filters, and safelight screens recently issued by Messrs. Wratten and Wainwright, Ltd., of Croydon. The particulars provided are practical in character, and the tables of sizes and prices conveniently arranged.

THE March issue of the *National Review* opens a new series, printed in larger type and provided with a different cover. Among its varied contents we notice an appreciation of the late Lord Kelvin by Sir William Ramsay, K.C.B., F.R.S., in which a delightful picture of Kelvin as a teacher is drawn, and a popular account given of some of his contributions to natural knowledge.

MESSRS. JOHN J. GRIFFIN AND SONS, LTD., have issued an illustrated and descriptive catalogue of apparatus suitable for demonstration purposes in the teaching of physiology, physiology, and hygiene. The information included respecting globes and lantern-slides should be particularly useful to teachers of geography who follow modern methods of presenting their subject.

A SECOND edition of Prof. G. S. Boulger's "Wood: a Manual of the Natural History and Industrial Applications of the Timbers of Commerce," has been published by Mr. Edward Arnold. The first edition was reviewed in NATURE of January 15, 1903 (vol. lxxvii., p. 245), and it will be sufficient here to say the work has been revised and enlarged, and that its price is now 12s. 6d. net.

THE National Home-Reading Union, with the cooperation of the Library Association, has arranged to publish a penny monthly magazine for the guidance of readers in public libraries in the choice of books and other reading. The first issue, that for February, is now available, and among its principal contents may be noticed articles by Prof. H. H. Turner, F.R.S., on books about astronomy; books about Australia, by Sir John Cockburn, K.C.M.G.; and the literature of the sea, by Mr. Frank T. Bullen. The *Reader's Review*, as the guide is called, is intended primarily for localisation in the various libraries by means of the insertion of additional pages containing local literary notes, lists of recent additions, and so on. The idea of assisting readers in their choice of books is excellent, and it is to be hoped that the efforts of the editorial board will prove successful. The paper is published by Messrs. Sherratt and Hughes.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN MARCH:—

- March 5. 1h. Venus in conjunction with Moon. Venus $5^{\circ} 49' N$.
 „ 8h. 59m. Minimum of Algol (β Persei).
 6. 3h. Mars in conjunction with Moon. Mars $5^{\circ} 26' N$.
 8. 10h. 10m. to 10h. 32m. Moon occults δ^2 Tauri (Mag. 4.2).
 9. 11h. 42m. to 1h. 31m. Transit of Jupiter's Satellite IV. (Callisto).
 10. Pallas (Mag. 8.04) in opposition to the Sun.
 12. 6h. 12m. to 9h. 54m. Transit of Jupiter's Satellite III. (Ganymede).
 13. 4h. Jupiter in conjunction with Moon. Jupiter $1^{\circ} 7' S$.
 19. 9h. 47m. to 13h. 28m. Transit of Jupiter's Satellite III. (Ganymede).
 20. 12h. Sun enters Aries, Spring commences.
 21. Venus. Illuminated portion of disc = 0.677.
 26. 22h. Mercury at maximum elongation West ($27^{\circ} 49'$).
 28. 7h. 30m. Minimum of Algol (β Persei).
 31. Ceres (Mag. 7.36) in opposition to the Sun.

MICROMETER OBSERVATIONS OF PHOEBE.—During the period July 24 to October 16, 1906, Prof. Barnard made a number of observations of Phœbe, Saturn's tenth satellite, of which he now publishes the results in No. 4234 of the *Astronomische Nachrichten* (p. 145, February 22). A variation of brightness, amounting to half a magnitude or more, is indicated by the fact that while the object was usually a difficult one, of magnitude 16.0 or 16.5, it was found to be comparatively easy during October, and was perhaps brighter than the sixteenth magnitude. On several occasions the satellite presented a hazy appearance, and Prof. Barnard suggests that, should future observations

confirm this nebulous or cometary character, the solution of the question of Phœbe's origin in the Saturnian system will be simplified.

EPHEMERIS FOR DANIEL'S COMET, 1907d.—The following is an extract from Herr Kritzing's ephemeris for comet 1907d, published in No. 4234 (p. 159, February 22) of the *Astronomische Nachrichten*:—

Ephemeris 12h. (Berlin M.T.).

1908	α (1908'o)	δ (1908'o)	1908	α (1908'o)	δ (1908'o)
	h. m.			h. m.	
Mar. 5 ... 15	4'4	−6 44'0	Mar. 21 ... 14	53'6	−5 6'9
„ 13 ... 14	59'7	−5 57'0	„ 29 ... 14	46'5	−4 15'5

The computed magnitude of this object is 10.6, and the comet is now apparently travelling eastwards through the constellation Libra towards Virgo, rising a little south of east at about 10.30 p.m. On March 17 it will be about $2\frac{1}{2}^{\circ}$ north of δ Libræ.

THE SPECTRUM OF THE AURORA BOREALIS.—An exhaustive summary and discussion of the results hitherto obtained from spectroscopic observations of the aurora appears in No. 9, vol. xxxv. (September, 1907), of the *Monthly Weather Review* (U.S. Weather Bureau), from the pen of Dr. W. Marshall Watts. All the recorded visual and photographic observations made since the time of Ångström's observations in 1867 are analysed and compared, and the most probable values for the wave-lengths of the principal lines are tabulated; for the chief green line this value is 5571.6, and for the red line 6303.4. Various observations suggest that the spectrum varies at different times, and Dr. Watts urges that far more numerous and continuous observations should be made. With the apparatus which he describes, such observations could be made at a very small cost by any qualified observer.

SUN-SPOT SPECTRA.—No. 1, vol. xxvii., of the *Astrophysical Journal* (January) contains two papers which should prove of interest to all workers in solar physics. The first of these is by Prof. W. S. Adams, and really consists of a preliminary catalogue of lines affected in sun-spots. The photographs on which these lines were detected were taken with a Littrow spectrograph, used in conjunction with the Snow telescope of the Mount Wilson Solar Observatory, and give a linear dispersion of 1 mm. = 1.5 Å. The present catalogue includes a list of the lines affected in sun-spots in the region λ 4000 to λ 4500, and is to be followed by other lists giving the results obtained in other parts of the spectrum. The lines, their behaviour, and their origins are not discussed now, the discussion being reserved until the catalogue is complete; the present list includes nearly 900 lines, for each of which the probable origin, the intensities in Rowland's table and in the spot, together with remarks on its behaviour in the spot, are given.

In the second paper Mr. Charles M. Olmsted, of the Mount Wilson Observatory, announces that he has succeeded in identifying certain bands in the sun-spot spectrum with similar bands in the spectrum of the calcium arc burning in an atmosphere of hydrogen. There are two main groups of these bands, the stronger one at λ 6385, the weaker running through the B group, and the comparison with the spot spectrum leaves no doubt as to their identity.

ASTRONOMY IN WALES.—The *Cambrian Natural Observer* (January) contains several papers on astronomical subjects read before the Astronomical Society of Wales last year. Among others may be mentioned a paper by Mr. T. E. Heath on star clouds and nebulae, another dealing with transits past and present, and an abstract of a paper by the Rev. John Griffith on the astronomy of the stones, delivered in November last before a crowded meeting of the Cardiff Archaeological Society and the Astronomical Society in Wales. Sir Norman Lockyer's method of investigation of stone monuments was explained, and the audience was urged to aid in the accumulation of the orientation data which is apparently so abundant in Wales.

The periodical is again to be issued as a quarterly.